III

ENVIRONMENTAL SETTING

A. PHYSIOGRAPHY AND GEOLOGY

The site lies is within the Atlantic Coastal Plain Physiographic Province which is generally characterized by lowlying, nearly level topography. The Coastal Plain was formed by the deposition of material transported from beyond the Fall Line, and it is characterized by masses of unconsolidated sediments comprised of sands, gravels and clays of marine or fluvial origin. The site occupies a low knoll or ridge with a maximum elevation of approximately 50 feet above mean sea level (amsl). Surface elevations in the surrounding area lie at approximately 45 to 47 feet amsl.

Delaware may be divided into physiographic zones of similar geography and topography that are useful for discussion of prehistoric cultural manifestations (Custer 1986). Site 7S-F-68 falls within the Mid-Peninsular Drainage Divide physiographic zone which has been described as the "backbone" of the Delmarva Peninsula (Thomas 1966:3 in Custer 1986). This zone is defined by the Atlantic-Chesapeake watershed line that separates the headwaters of streams that flow toward the east and empty into the Delaware Bay and those that flow to the west through Maryland and empty into the Chesapeake Bay (Ireland and Matthews 1974).

In addition flat topography and slow-moving headwaters of the streams that empty into the Delaware and Chesapeake Bays, the Mid-Peninsular Drainage Divide zone is also characterized by swamps surrounded by sand ridges and by bay/basin features (Custer 1986). The site area is drained by headwaters and high-order tributaries of the Nanticoke River, which empties into the Chesapeake Bay. There is no visible stream channel within the wetland area immediately south of the site.

The surficial deposits in the site area have been identified as the Columbia Formation, a Pleistocene deposit consisting mostly of coarse-textured sediments that ranges in thickness from less than one foot to several feet. Landscapes associated with the Columbia Formation typically exhibit evidence of extensive reworking during the Holocene. The rise occupied by the site is most suggestive of a dunal landscape form, which is fairly common throughout southern Delaware. Often located at the margins of large swamp areas, these dunes exhibit varying sizes and complex curving forms (Wagner 1982).

B. SOILS

Site 7S-F-68 lies within the Pocomoke-Fallsington-Evesboro soils association, which is made up of soils that are poorly drained with a moderately permeable sandy loam or sandy clay subsoil and soils that are excessively drained with a rapidly permeable sandy subsoil. The site area occupies a small area of Evesboro loamy sand (loamy substratum, 2-5% slopes). Evesboro soils are typically coarse-textured and occupy upland settings, and they are characterized by excessive drainage (Ireland and Matthews 1974).

The pedological analysis undertaken for this study (Wagner 1992) included field examination of exposed profiles as well as laboratory analysis of particle size distributions and chemical properties. The particle size analysis strongly supported the dunal origin of the site's landscape setting, the profiles were dominated by fine and medium sands which are readily borne by wind.

Particle size distributions for Excavation Units 27 and 32 (Figure 3) demonstrate the range in soil composition with the site area. Unit 27, located in the more elevated area of the site with the highest density of prehistoric cultural material, is most representative of the site area. In that unit, particle size distribution is nearly constant with depth. Throughout most of the site, only very slight soil differences were apparent with depth.

The Unit 32 profile exhibits greater subsoil development as well as a finer-textured substratum, represented by the Cg horizon. The higher clay and silt content in the Unit 32 profile probably underlies the higher portion of the site area, and augering in the wetland area to the south the site identified a comparable subsoil within a half meter of the surface. This sandy clay loam substratum appears to have been the basal deposit upon which the eolian sands were deposited during the Pleistocene (Wagner 1992).

Sandy soils typically display weak soil development, and they are quite susceptible to vegetative denudation, reworking, and erosion. Natural processes such as animal burrowing and tree fall also contribute significantly to mixing and reworking in sandy soils. Despite the difficulties of interpreting weathering and horizonation in sandy soils, the particle size distribution in the Unit 27 profile suggests two sequences of

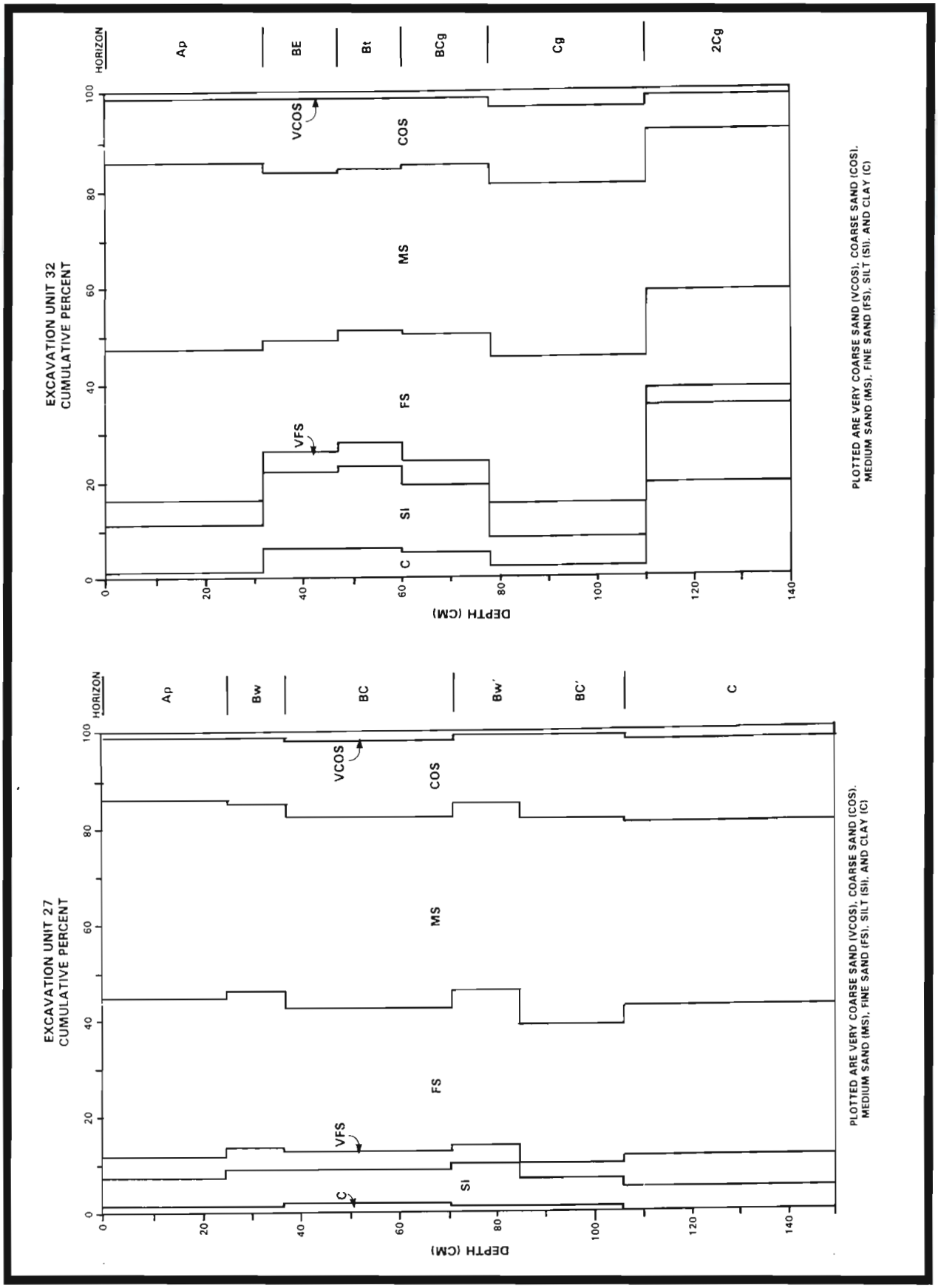

FIGURE 3: Soil Particle Size Distribution, Excavation Units 27 and 32

deposition and weathering. The two soil formation intervals are suggested by the two weathering intervals represented by the Bw-BC and Bw'-BC' horizons. The lower sequence (Bw'-BC') appears to represent an earlier interval of soil formation that was subsequently buried by a more recent deposition event. Given the difficulty of estimating the age of weathered substrata in sandy soils, it is suggested that periods of deposition could be correlated with dry periods. The lower horizon could then be correlated with the early Holocene, while the later soil formation episode could be correlated with a more recent xeric interval (Wagner 1992).

The bisequal profile seen in Unit 27 is not representative of the entire site. The more strongly developed soil of Unit 32 probably correlates with the lower sequence of Unit 27, and the lower, more poorly drained setting of Unit 32 would have afforded more landscape stability and more favorable conditions for vegetation during dry periods. Only a single weathering sequence was seen in the profiles of Units 48/35, located in an elevated area of the site. The single weathering sequence in this unit probably correlates with the upper, more recent sequence in Unit 27 (Wagner 1992).

The soil chemical tests for the site are typical of Coastal Plain soils (Table 1). The soils are strongly acidic, but despite the presence of a plowzone, there is little for the application of chemical fertilizers. Unit 27 did exhibit high to very high concentrations of phosphorous, and this may be associated with the prehistoric occupation of the site. Application of fertilizer during the historic period could account for the elevated phosphorous content, but there is no evidence of any associated chemical fertilizer residues. Phosphorous does not readily move within a soil profile, and elevated phosphorous levels are commonly associated with prehistoric occupation sites (Wagner 1992).

C. PALEOENVIRONMENT

Given the widespread evidence of human occupation of the Middle Atlantic Coastal Plain beginning as early as the Late Pleistocene, a reconstruction of the regional environmental history should consider at least the last 11,000 years. The primary factors to be considered in a local paleoenvironmental reconstruction are changing climatic conditions and sea levels which, in turn, influenced the local distribution of floral and faunal resources. Analysis of fossil pollens has provided the most direct method for inferring past environmental conditions. Paleoclimatic conditions can be inferred from fossil pollen evidence because of the ecological relationship that exists between biotic communities and their environment. The analysis of fossil pollen is used to determine the composition of past vegetational communities, and using the knowledge of the present relation of climatic variables such as temperature and moisture to certain plant species and genera, past climatic conditions are inferred. The concept of plant succession is the principal technique for determining past changes in vegetation and, by inference, climate (Ogden 1965:488).

During the Pleistocene epoch, a series of massive continental glaciers advanced and retreated over much of North America. Because vast amounts of water were incorporated into these ice sheets, the sea levels were 300 to 500 feet lower than at present. The late Pleistocene was not only slightly cooler than the present, but was also characterized by higher levels of precipitation (Carbone 1976). The generally accepted marker for the end of the Pleistocene is the beginning of the glacial retreat immediately following the Valders substage maximum, which has been dated ra

TABLE 1: RESULTS OF SOIL CHEMISTRY ANALYSIS

UNIT	DEPTH	Org.%	P	K	Mg	Ca	pH
27	0-25 cm	0.8	62	16	8	50	5.0
27	25-37 cm	0.5	61	12	7	30	5.0
27	37-71 cm	0.2	53	11	5	30	4.9
27	71-85 cm	0.1	51	16	12	50	5.2
27	85-106 cm	0.1	26	13	15	70	5.4
27	106-153 cm	>0.1	50	9	9	60	5.7
32	0-32 cm	1.4	36	40	15	50	4.9
32	32-47 cm	0.8	15	35	6	20	4.8
32	47-60 cm	0.2	8	30	11	20	4.8
32	60-78 cm	0.1	7	26	12	30	4.8
32	78-110 cm	>0.1	28	12	10	50	4.9
32	110-122 cm	0.3	11	32	38	110	4.8

Chemical Tests: Org. % -- percent of organic matter; P -- available phosphorous; K -- potassium: Mg -- magnesium; Ca -- calcium; pH -- soil acidity.

diometrically to about 10,500 years BP.

The clustering of a large world-wide sample of radiocarbon dates indicated that an abrupt climatic shift occurred over a period of a few decades, marking the beginning of the present Holocene epoch (Bryson et al. 1970). As the sea levels rose with the release of the glacial meltwater, the ancestral Susquehanna River Valley and the Delaware River Valley were drowned, and the rising water eventually formed the estuarine environments of the Chesapeake Bay and the Delaware.

While data indicate that the sea level has been rising continuously during the past 12,000 to 14,000 years, the rate of marine transgression over the Coastal Plain has varied considerably. In the millenia immediately following the glacial maxima, sea levels rose relatively rapidly, while in the most recent millenia, sea levels have been rising at a rate of somewhat less than one foot per century (Edwards and Merrill 1977).

Amelioration of the glacial climatic conditions that characterized the Pleistocene epoch led to the establishment of modern environmental conditions. The first pollen studies in North America defined a sequence of five climatic episodes, differentiated according to relative temperature and moisture. This climatic sequence from post-glacial to modern times included five relatively distinct periods: (1) a moist, cool post-glacial period represented by a maximum of spruce and fir; (2) a dry, warmer period represented by a maximum of pine; (3) a more humid and warm period represented by beech and mixed deciduous elements such as oak and hemlock; (4) a warm, dry period represented by a maximum of oak and hickory; and (5) the modern period, more moist and cool than the preceding period, represented by a mixed deciduous composition dominated by oak and chestnut (Deevey 1943; Sears 1942).

The biogeographical patterns of the Middle Atlantic Coastal Plain for the late Pleistocene have not yet been definitively reconstructed. Detailed paleoenvironmental syntheses have been completed for the Shenandoah Valley (Carbone 1976) and the Upper Delaware Valley (Dent 1979). These studies are useful for understanding regional paleoenvironmental conditions, however, a reconstruction of local conditions should also consider applicable pollen cores. For Delaware, Custer (1984, 1986) relies heavily on Carbone's (1976) work and discusses paleoclimatic history in terms of an episodic model wherein abrupt, rather than gradual, changes in climate influenced the regional biogeography.

There are no available pollen profiles that would be wholly suitable for reconstruction of the environmental history of the 7S-F-68 site area. The environmental character of the site area vicinity must be inferred from a consideration of regional conditions such as overall trends in climate together with the local variations in altitude, lithology, soils, solar exposure, and drainage. Dent (1985) has demonstrated that many distinct plant communities may exist within a geographically restricted area, depending on variations in altitude, exposure to sunlight, and availability of water.

Custer's (1984, 1986) discussion of the Lower Coastal Plain paleoenvironmental sequence would be generally applicable to the site area, as there is scant information to treat separately the Mid-Peninsular Drainage Divide physiographic zone. Pollen samples were recovered from the Dill Farm site, located in southern Kent County, and these would pertain directly to the Mid-Peninsular Drainage Divide zone; however, the Dill Farm sequence does not fully represent the Late Glacial and Holocene, so that it is of somewhat limited value. A summary of the regional paleoenvironmental history, based on Custer's (1984, 1986) statewide synthesis, is presented in Table 2.

For more than 15 years, Carbone's (1976) research in the Shenandoah Valley has been the principal source of paleoenvironmental data for archaeologists working in the Middle Atlantic region. However, a recently-extracted pollen core from an abandoned stream channel near the Indian Creek Site (18PR94) in Prince Georges County, Maryland has provided important new information for reconstruction of regional prehistoric environments in the Middle Atlantic Coastal Plain (LeeDecker et al. 1991). The DB-6 pollen core from Indian Creek contains a virtually complete record of the local vegetational succession from the Late Glacial to the historic period. Seven pollen zones were defined in the DB-6 core, based on pollen percentages and influxes of individual species, and the chronology of the pollen zones was accomplished by a suite of radiocarbon dates and calculation of sedimentation rates between dated horizons (Brush 1990).

During the Late Glacial period, the climatic patterns in the region were controlled to a large extent by the presence of the Laurentide ice sheet. The ice sheet would have prevented incursions of northern Arctic air in the lower continental region, thereby allowing somewhat warmer winter temperatures in the midcontinental area. Strong Pacific westerly winds would have prevailed, and the proximity of the maritime tropical air mass to the edge of the ice sheet would have created a zone of intense frontal activity in the northern unglaciated portions of the Middle Atlantic region.

Available pollen evidence indicates that the dominant forest elements were spruce and pine and that nonar

TABLE 2: PALEOENVIRONMENTAL EPISODES, DELAWARE LOWER COASTAL PLAIN

EPISODE	DATES	GENERAL CHARACTERISTICS
Late Glacial	10,000-8,000 B.C.	Mosaic of different vegetational communities; open grasslands within coniferous forests; deciduous elements present in wetland areas, etc.; bay/basin features open and active; animals include cold-adapted megafauna (musk ox, mammoth, mastodon), peccaries, white-tailed deer, caribou, elk, beaver, etc.
Pre-Boreal/ Boreal	8,000-6,500 B.C.	Reduction of open grasslands and spread of forests dominated by pine and northern hardwoods; extinction of Pleistocene megafauna and reduction of habitat for grazing and browsing species
Atlantic	6,500-3,100 B.C.	Full appearance of modern environment with warm, moist conditions; continental climate with marked seasonal differences; widespread dominance of mesic oak-hemlock forests; modern faunal communities
Sub-Boreal	3,100-800 B.C.	Warm, dry climate (mid-postglacial xerothermic) at the beginning of the episode, followed by gradually increasing moisture and cooling temperatures; spread of grasslands and reduction of oak-dominated forests
Sub-Atlantic	800 B.C.-recent	Cooling reduced the moisture stress of the Sub-Boreal, leading to essentially modern conditions; upland forests include a mix of coniferous and deciduous species; reduction of sea level rise permits florescence of estuarine environments in coastal areas

Source: Custer (1984, 1986)

boreal flora, such as grasses, shrubs, and herbs, were also present. This may be indicative of a mosaic of vegetational habitats, including open grasslands, coniferous forests, and deciduous floodplain forests. The Full Glacial and Late Glacial fauna would have included a variety of extinct and currently existing animals. Some of the larger animals that would have been present include browsing mastodon, mammoth, horse, camel, caribou and white-tailed deer, while the smaller animals would have included wolf, skunk, otter, weasel, fox, moles, shrews, squirrels, lemmings, and mice (Carbone 1976; Custer 1984).

The Late Glacial vegetation in the Indian Creek vicinity, represented by Zone 1 in the DB-6 core, was dominated by pine and spruce, with alder becoming more abundant toward the end of the period. Among the nonarboreal plants, madder, milkwort, and composites were dominant. Cool, floodplain conditions are clearly indicated by the pollen record.

A rapid shift in the climatic patterns that occurred circa 10,500 BP marked the onset of the Preboreal/Boreal episodes. This was marked by an increase in the duration of southern air masses, an increase in temperatures, and an increase in available sunshine brought about by a reduction in cloudiness. By 8000 years BP, the glacial ice mass was still large enough to influence air circulation patterns, and strong westerly winds still prevailed. Regional vegetation patterns were characterized by the reduction and eventual closure of open grassy habitats and the replacement of spruce by pine or deciduous species. The establishment of northern hardwood forests occurred in the Coastal Plain during the Preboreal episode. The increased temperatures and reduction of grassland led to a northern retreat of animals adapted to grassland and forest-edge habitats, and this Preboreal/Boreal episode as a whole was characterized by a reduction in biological carrying capacity. The disappearance of the Late Glacial vegetational mosaic may have heightened the importance of wetland areas to animals such as deer, elk, and moose (Carbone 1976; Custer 1984).

The Preboreal/Boreal episode is represented by Zone 2 in the DB-6 core. Zone 2 is marked by a major increase of birch and a decrease of pine and spruce, while alder decreases somewhat but remains plentiful. Oak increases in this zone but remains less plentiful than birch. Goldenrod and arrowwood are abundant among the non-arboreal taxa. Warming conditions are indicated by the increase of oak, and the abundance of goldenrod may be indicative of open areas within the local landscape.

A sharp reduction in the duration of Arctic air masses occurred during the Atlantic episode, allowing a continuous warming trend that was accompanied by an increase in precipitation. Regional vegetation patterns were characterized by an initial expansion of hemlock and later of oak. The warm, wet conditions of this episode may have fostered the expansion of wetland areas. Modern fauna were established during this episode, and the principal animals of importance to human populations were turkey and deer (Carbone 1976; Custer 1984).

Warming conditions are indicated by the pollen composition of Zone 3 in the DB-6 core, dated circa 5700-3000 BC, and this zone also indicates much more moist conditions. The reduction of pine and birch and the disappearance of spruce and fir occur in this zone. Oak, hazelnut, and alder are the dominant arboreal species, and maple, black gum, beech, ash, and walnut are also present. Cinnamon-fern is the dominant herbaceous species, and sedges reach their peak in this zone. The warm, moist conditions indicated by Zone 3 appear to correspond with the early part of the Atlantic climatic episode; however, the onset of the Atlantic episode is believed to have occurred circa 6500 BC (Carbone 1976; Custer 1984), somewhat earlier than the onset of Zone 3 conditions at Indian Creek.

The postglacial warming trend culminated during the Subboreal episode. Regionally, the xerothermic conditions led to an expansion of grasslands and the dominance of an oak-hickory forest type. Squirrel and turkey populations would have benefited from the dominance of nut-bearing trees, while species intolerant of dry habitats would have declined. Amelioration of the xerothermic conditions at the close of the Subboreal permitted the establishment of modern forest conditions. The reduction in the rate of sea level rise that occurred during the Subboreal permitted the establishment of stable estuarine environments in the tidal areas of the Coastal Plain.

With the formation of tidal wetland marshes adjacent to the Chesapeake Bay and the Delaware Bay, the Delmarva peninsula reached its peak carrying capacity, replete with waterfowl, shellfish, and marine fish (Carbone 1976; Custer 1984; Wesler 1985). Essentially modern environmental conditions continued through the Sub-Atlantic episode, with minor climatic fluctuations.

The drier, mesic conditions of Zone 4 in the DB-6 core probably correspond to the mid-postglacial xerothermic conditions during the Subboreal climatic episode. In Zone 4, oak continues as the dominant arboreal species, and cinnamon-fern reaches its peak. Pine, hickory, and walnut increase in this zone, while alder, birch, and hazelnut decrease. In addition to cinnamon-fern, abundant non-arboreal taxa include blueberry and elderberry, while arrowwood and buckwheat are present in moderate frequencies.

Zone 5 in the DB-6 core indicates that significant change in the local environment occurred after circa 2000 BC (3860 BP). Zone 5 is marked by a major reduction of arboreal pollen and an expansion of herbaceous species. Oak accounts for the majority of the arboreal pollen, but in significantly decreased frequencies. Major influxes of the bean family and elderberry, together with moderate increases in blueberry and arrowwood, mark Zone 5, which lasted until circa AD 200.

At the regional scale, Sub-Atlantic climatic conditions, characterized by the return of cooler, more moist conditions, led to the reestablishment of mixed deciduous forests, beginning circa 800 BC. However, non-arboreal species continued to dominate the local environment in the Indian Creek vicinity until the historic period. Arboreal pollen remained at low levels in Zone 6, and many of the herbaceous taxa also disappeared. Ericaceae (blueberry spp.) increased during this interval, possibly indicating the presence of heaths adapted to cool conditions. Cattail, which is present exclusively in Zone 6, is also represented in moderate numbers. At Indian Creek, the Zone 6 conditions persisted until the European contact.

D. FLORA AND FAUNA

Essentially modern environmental conditions were reached approximately 1000 years before the present, that is during the Sub-Atlantic episode. Some minor fluctuations have occurred since that time, but it is generally recognized that modern distribution of flora and fauna closely approximates that of the past thousand years. Of course, one must recognize the profound environmental changes that have occurred as a result of cultural modification of the landscape.

At the time of the initial European contact, the vegetative cover in the Middle Atlantic Coastal Plain was primarily a deciduous forest. This hardwood forest and its associated vegetation would have provided a fairly abundant supply of nuts, fruits, bulbs, and leaves. The terrestrial animals that inhabited the region included white-tailed deer, black bear, porcupine, squirrel, chipmunk, woodchuck, turtle, weasel, skunk, fox, wolf, cougar, raccoon, opossum, muskrat, otter, mink, beaver, turkey, shrew, rabbit and bobcat (Turner 1976, 1978).

Oak would have been the dominant deciduous element in the forests surrounding 7S-F-68 site vicinity, with an admixture of loblolly pine, Virginia pine and other

deciduous species. Poorly drained wetland areas would have included pin oak, willow oak, red maple, sweetgum, blackgum, holly, sweetbay, dogwood, beech, birch, red cedar and cypress (Custer 1984, 1986; Ireland 1974).

E. SITE CATCHMENT ANALYSIS

Thomas et al. (1975) conducted a survey of environmental resources available in the Delaware Coastal Plain, and the results of that study may be used to evaluate the resource potential of the catchment area surrounding the site. In Sussex County, much of the Mid-Peninsular Drainage Divide area had an oak-gum-maple-cypress climax forest associated with flat upland topography, which was classified as a poorly drained swamp zone by Thomas et al.. Although the site area occupies slightly elevated knoll or dunal landform within this zone, the surrounding catchment area is overwhelmingly dominated by upland wetland areas.

The Redden State Forest and the Ellendale State Forest, located along Rt. 113 to the north of the site, contain extensive areas of upland wetlands. The understory vegetation of these poorly drained to swampy woodland areas is very dense, a feature that affords excellent cover for wildlife such as turtles, snakes, ducks, deer, bear, squirrel, rabbit, mink, otter, muskrat, turkey and beaver. Deer and other browse-oriented species find this habitat especially attractive (Thomas et al. 1975). Numerous floral resources are available in wetland areas, providing a wide variety of seeds, roots, tubers, and leafy greens of known ethnographic use for food, medicine, and other uses.

TABLE 3: SUMMARY OF FAUNAL AND FLORAL RESOURCE AVAILABILITY IN SITE CATCHMENT AREA

RESOURCE	AVAILABILITY
Faunal Resources	
Eastern cottontail	high
Gray squirrel	high
White-tailed deer	high
Beaver	high
Wild turkey	medium to high
Muskrat	low
Geese and ducks	low
Otter, mink, and weasel	low
Anadromous fish	low
Shellfish	low
Floral Resources	
Greens	high
Roots	high
Fruits	high
Seeds	medium to high
Nuts	medium

Some important resources known to have been important in aboriginal subsistence would have been virtually absent from the site catchment area, particularly waterfowl, shellfish, and anadromous fish (Table 3). These resources would have been seasonally abundant in other areas of the Delmarva Coastal Plain. Waterfowl, which are abundant during migratory seasons, prefer open marshy habitats, which are found in the tidal areas in the coastal zone. Resources such as shellfish and anadromous fish would have been most abundant in the riverine and estuarine areas in the coastal and mid-drainage zones. Located on a drainage divide, the site catchment area lacks significant water courses that would have provided the optimum habitat for fauna such as mink, otter, and weasel.

A site catchment analysis was undertaken, based on a technique developed by Roper (1979). Using soils information as a basis for classification of the environment, the area surrounding Site 7S-F-68 was broken into three major groups (1) well-drained, (2) moderately well drained, and (3) poorly drained. These soil groups would respectively correlate with the Well-Drained Woodlands, Transitional, and Poorly Drained Woods and Swamp micro-environments defined by Thomas et al. (1975). The acreage occupied by each soil category was computed in three zones surrounding the site, which were successively defined within a one-mile, two-mile or three-mile radius of the site (Table 4).

The results show that the general area surrounding the site is dominated by poorly drained soils, which is perhaps typical of the Pocomoke-Fallsington-Evesboro soils association which occupies much of Sussex County (Ireland and Matthews 1974). Among the three catchment areas considered, the smallest (acreage within a one-mile radius of the site) exhibits the highest proportion of poorly drained acreage, which suggests that the site location was selected for maximum access to resources in this poorly drained (i.e., swamp) areas. As one moves away from the site, the relative proportion of swampy acreage decreases, as shown by the amounts of poorly drained soils in the 1-2-mile and 2-3-mile catchment zones.

The site itself occupies a well-drained setting afforded by a narrow dune-like formation that projects into a large swamp. Figure 4 illustrates the distribution of well-drained, moderately well-drained, and poorly drained soils within the 1-mile catchment area surrounding the site.

TABLE 4: SITE CATCHMENT ANALYSIS BY SOIL DRAINAGE

CATCHMENT AREA	SOIL CLASSIFICATION			TOTAL
	WELL-DRAINED (ACRES/%)	MODERATELY DRAINED (ACRES/%)	POORLY DRAINED (ACRES/%)	(ACRES/%)
< 1 MILE RADIUS	124 ac 6.2%	741 ac 7.0%	1,746 ac 86.8%	2,011 ac 100%
1-2 MILE RADIUS	947 ac 15.7%	470 ac 7.8%	4,614 ac 76.5%	6,031 ac 100%
2-3 MILE RADIUS	4,379 ac 24.2%	1,212 ac 6.7%	12,505 ac 69.1%	18,096 ac 100%

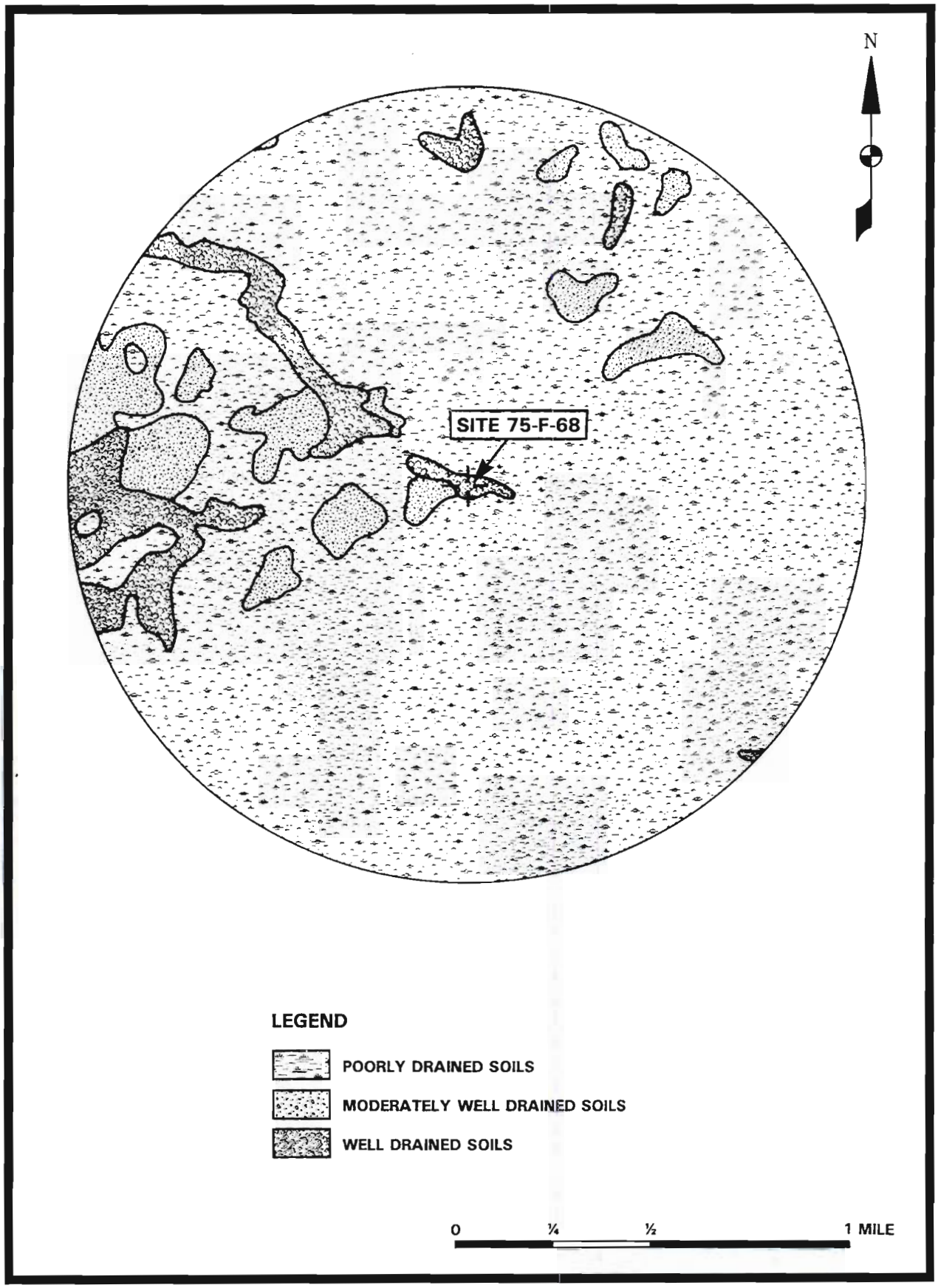

FIGURE 4: Site Catchment Area